

# Randomized controlled trials of interventions to change maladaptive illness beliefs in people with coronary heart disease: systematic review

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# **Randomised controlled trials of interventions to change maladaptive illness beliefs in people with coronary heart disease: A systematic review**

## **Abstract**

**Aims:** To report on a systematic review of randomised controlled trials (RCTs) of interventions to change maladaptive illness beliefs in people with coronary heart disease (CHD), and to assess the effectiveness of changing these beliefs on coping and outcome.

**Background:** An increasing body of evidence suggests that faulty beliefs can lead to maladaptive behaviours and in turn to poor outcomes. However, the effectiveness of interventions to change such faulty illness beliefs in people with CHD is unknown.

**Data Sources:** Multiple data bases were searched using a systematic search strategy. In addition, reference lists of included papers were checked and key authors in the field contacted. There was no date restriction.

**Review Methods:** The review included RCTs among adults of any age with a diagnosis of coronary heart disease, comparing interventions that included a component aimed at changing beliefs. The primary outcome measured was change in beliefs about CHD.

**Results:** Thirteen RCTs met the inclusion criteria. Owing to the heterogeneity of the identified studies, quantitative synthesis was not practicable. Descriptive synthesis of the results suggested that cognitive behavioural and counselling / education

interventions can be effective in changing beliefs. The effects of changing beliefs on behavioural, functional and psychological outcomes remains unclear.

**Conclusion:** While some interventions may be effective in changing beliefs in people with CHD, the effect of this change on outcome is not clear. Further high quality research is required before firmer guidance can be given to clinicians on the most effective method to dispel cardiac misconceptions.

## **Summary Statement**

- **What is already known about this topic**
  - A number of studies demonstrate a link between negative illness beliefs and poor outcome in people with CHD.
  - A range of cardiac misconceptions regarding causation, physiology and coping exist.
  - Some UK guidelines for the management of people with CHD recommend that cardiac misconceptions are dispelled.
  
- **What this paper adds**
  - The present review shows that it is possible to devise interventions to significantly and positively change misconceptions and maladaptive illness beliefs in people with CHD.
  - The review demonstrates that cognitive behavioural interventions appear particularly effective in changing illness beliefs, and counselling and / or educational interventions can be effective in some circumstances.
  - The specific effects of changing illness beliefs on other outcomes has not been demonstrated, as most interventions tested so far are multi-factorial.
  
- **Implications for practice and/or policy**
  - The present review demonstrates the need for additional methodologically sound and adequately powered trials of interventions

to change maladaptive illness beliefs in people with CHD. Such trials should aim to assess the specific effects of changing illness beliefs on any change in behavioural, functional or psychological outcomes.

- It may be beneficial for clinicians to identify and correct maladaptive beliefs with the intention of encouraging positive coping strategies and behaviours.
- Primary prevention strategies which are designed to dispel common misconceptions about CHD and educate about the causes and consequences of CHD in the population at large may also be useful.

### **Keywords**

Systematic review; Literature review; heart diseases; illness perceptions, misconceptions; beliefs; cardiac rehabilitation.

### **Introduction**

Coronary heart disease (CHD) is the term used to describe a build up of fatty deposits (atheroma) in the coronary arteries. This review uses the term 'CHD' as an umbrella term to describe people with a diagnosis of coronary heart disease / coronary artery disease (CAD), angina (stable or unstable), myocardial infarction (MI), and those eligible for revascularisation procedures such as coronary artery bypass graft (CABG) and percutaneous coronary intervention (PCI) (which includes percutaneous transluminal coronary angioplasty (PTCA) and stenting, both of which are procedures that help to improve the blood supply to the heart muscle). The common factor in each of these patient groups is a build up of atheroma in the coronary arteries. The review is not applicable to people with congenital heart

defects, other vascular diseases or those with heart failure that is not a consequence of CHD, as these illnesses have different causes and physiology to CHD.

CHD is a largely preventable disease which accounts for more than 7.2 million deaths worldwide every year (World Health Organisation 2009). The societal burden of CHD is a substantial one. In total, it was estimated that CHD cost the UK economy £8.47 billion in 2004 (Luengo-Fernández *et al.*, 2006).

Many people with CHD experience reduced quality of life, often suffering from anxiety, depression, emotional and social disturbance and failure to return to work (Petrie & Weinman, 1997). It is thought that this initial psychological disturbance often impacts upon long term behaviour change thus resulting in failure to adopt a healthy lifestyle. It can be proposed that these behavioural and emotional difficulties arise as a result of individuals' faulty cognitive perceptions of their illness.

A number of studies demonstrate a link between negative perceptions and poor outcome in people with CHD. For example, Furze *et al.*, (2005) demonstrated that maladaptive beliefs about angina were more significantly related to poorer functional and psychological outcome at one year than self report of symptoms. Furthermore, Petrie *et al.*, (1996) discovered that MI patients' illness perceptions during hospitalisation were significant predictors of return to work, functional ability at home and recreational and social activity, with negative perceptions predicting poor outcome. In a seminal study, Wynn (1967) found that more than 50% of 400 people with CHD held misconceptions about MI that were causing undue fear and anxiety and often resulted in failure to return to work. Additionally, Maeland and Havik (1987) reported that MI patients' in-hospital predictions about their return to work were a good predictor of actual return to work regardless of severity of the illness. Thus it

appears that negative illness perceptions rather than physiological factors are the major cause of psychological and vocational disability in people with CHD.

Riegel (1993) demonstrates that it is common for people with CHD to worry that physical activity will cause MI or damage to the heart and thereafter abstain from even mild activity. This inappropriate behaviour leads to cardiac deconditioning, thus exacerbating the symptoms of CHD and making angina and MI more likely. The incorrect belief that total rest is good for people with CHD while physical activity could be dangerous is one of several misconceptions commonly held within society. Other examples include 'angina is a small heart attack', 'angina is caused by worry, stress or work', 'it is dangerous for people with heart problems to argue' (Furze *et al.*, 2003), 'after a heart attack, a patient should not fly for 6 months', 'I've smoked for 20 years, it's too late now' and 'hard work causes heart disease' (Lewin *et al.*, 2002a). These examples of incorrect cardiac beliefs are by no means exhaustive but demonstrate that a range of misconceptions about causation, physiology and coping exist. Such misconceptions are commonplace. Sykes *et al.*, (2006) discovered that 83% of angina patients held misconceptions about their illness. Furthermore, people in a study of preparation for CABG surgery held a mean of 8 (of a possible 24) common cardiac misconceptions (Furze *et al.* 2009).

It is important to explore theory which links negative perceptions and misconceptions to behaviour and health outcomes. Self-regulatory models such as Leventhal's Common Sense Model (CSM) (Leventhal *et al.*, 1980, 1984) arguably offer the best explanation. The CSM suggests that people have an active processing system which allows them to respond to an illness threat in three recurring stages: illness

representation, coping and appraisal. During the illness representation stage an individual independently develops both a cognitive representation of the health threat and an emotional reaction to this threat. Leventhal (1980) termed this 'parallel processing'. These reactions determine the coping strategy that is implemented. The feedback generated during appraisal may be used to create new illness representations and coping strategies, thus forming a self-regulatory feedback loop (Lau-Walker, 2006). In a systematic review of empirical studies of the CSM, Hagger and Orbell (2003) demonstrated that the relationships between illness cognitions, coping and outcome were as theoretically predicted across the studies, thus illness beliefs are directly related to coping strategies and resulting behaviours.

Interventions to change maladaptive illness beliefs may therefore be beneficial to people with CHD, as positive illness representations may lead to positive modification of lifestyle (for example engaging in exercise and stopping smoking) which will help to control the disease. Indeed, the findings from the studies outlined above has led the Scottish Intercollegiate Guideline Network (SIGN) to recommend that cardiac misconceptions are dispelled during cardiac rehabilitation (SIGN 2002) and in the management of stable angina (SIGN 2007). However, at present we do not know for certain whether illness cognitions such as knowledge, attitudes and beliefs can be successfully changed via intervention in people with CHD and whether such change could also lead to positive behaviours and outcomes. Consequently, we do not know which types of intervention to change illness cognitions (e.g. counselling, education or cognitive behavioural) are most effective in eliciting positive outcomes. The present systematic review was therefore necessary to collate and



present evidence of the effectiveness of maladaptive belief change interventions that are administered to people with CHD.

### **Aims**

The aims of the systematic review were to establish whether interventions can significantly change maladaptive illness cognitions in people with CHD and to demonstrate which types of intervention are most effective. The review also aimed to assess whether change in beliefs was accompanied by changes in behavioural, functional and psychological outcomes.

### **Design**

The conduct of the systematic review followed the guidelines produced by the NHS Centre for Reviews and Dissemination (Khan *et al.*, 2001). The Cochrane Collaboration handbook (Higgins & Green, 2008) was also consulted. Prior to starting the review, a detailed protocol of the entire methodology was produced and this was adhered to at each stage. The QUOROM statement was used to guide reporting of the review.

### **Search Methods**

The following key electronic databases were searched: MEDLINE, EMBASE, CINAHL, BNI, PsychINFO, The Cochrane Library (including the Cochrane Database of Systematic Reviews, CENTRAL and DARE) and the Web of Knowledge (including the Science Citation Index and ISI proceedings). There was no date restriction. (See Appendix 1 for an example of the search strategy.)

Reference list checks of the studies found using electronic databases were made. Additionally, citation tracking of key papers was conducted to track relevant research forwards in time. Key authors in the field were contacted and general searches using internet search engines were conducted.

As the main aim of the study was to comprehensively review the evidence base to look at the effectiveness of interventions to change beliefs in people with CHD, a sensitive search strategy was used. However, owing to lack of funds for translation, only studies reported in English were reviewed. Where abstracts of studies were identified with no full paper reporting the results, authors were contacted. If this produced no reply, the abstract was excluded due to insufficient detail to undertake quality appraisal. Checks were made to ensure that data from each primary study were not included more than once in the review. Two reviewers applied the following pre-specified inclusion criteria to all potentially relevant studies to determine study eligibility:

*Study Design:*

Studies which reported comparisons between the intervention group and either a control or another intervention, and which included randomisation of participants (randomised controlled trials) were included. All other study formats were excluded.

*Participants:*

Adults of any age with a diagnosis of at least one of the following:

- Angina
- Myocardial infarction
- Coronary heart disease

- Eligible for or recently received revascularisation via PCI or CABG surgery.

#### *Interventions:*

Any intervention which had a component aimed at changing: causal attributions or perceptions or misconceptions or beliefs about causation and/or physiology and/or coping and/or outcome in adults with heart disease was included in the review. Although the present review continually refers to 'interventions to change maladaptive beliefs', other closely related illness cognitions such as knowledge, attitudes, attributions, perceptions and misconceptions were included in this definition as ultimately we would like to know which of these cognitions is most strongly related to behaviour change and positive outcomes. However, it is acknowledged that these cognitions differ. Therefore, the point of this inclusion criterion was to include any intervention which attempted to change cognitions about CHD.

#### *Comparisons:*

Interventions to change maladaptive beliefs were compared to a different intervention, usual care or to no intervention.

#### *Outcomes:*

The primary outcome was change in beliefs (or other illness cognition) at follow-up. Secondary outcomes also recorded were: quality of life, behaviour change, change in anxiety or depression, change in psychological wellbeing, change in exposure to modifiable risk factors or exposure to protective factors.

### **Search Outcome**

A sensitive electronic search produced 3526 citations, which was reduced to 115 on citation review. A check of 10% of these citations was undertaken by an independent researcher from another University, with 100% concordance on abstracts to be retrieved. A review of abstracts identified 74 papers to retrieve in full. A further 7 papers were identified from reference checks and an additional relevant study was uncovered via contact with an expert in the field (Furze *et al.*, 2009). After a consensus meeting between all authors of the review, 13 studies were included. Each of these studies was a published journal article. The study selection flowchart (Figure 1) documents this process.

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**Figure 1 here**

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### **Quality appraisal**

Two reviewers independently undertook an unblinded quality assessment of the included studies using the Detsky Quality Assessment Questions (Detsky *et al.* 1992). These questions give scores for description of randomisation including blinding of treatment assignment, description of outcome measurement including blinding at assessment, details of inclusion and exclusion criteria, description of the intervention, sample size justification and description of analysis. The Detsky score range is 0-15 with higher scores indicating better quality.

## **Data abstraction**

Two reviewers independently carried out data extraction. Concordance in extraction was checked. Data extracted included: country, design, setting the intervention was delivered in, patient group, inclusion and exclusion criteria, participant characteristics, description of intervention and control treatments, numbers randomised to each group, time to follow up and losses to follow up, primary and secondary outcomes and results (including details of all outcome measures and outcomes, with point estimates, measures of variability and p values).

## **Synthesis**

Due to the nature of interventions to change maladaptive illness cognitions there was heterogeneity in the interventions, participants, outcome measures and outcomes of included studies. Statistical and methodological heterogeneity were also problematic. Therefore a descriptive data synthesis was undertaken to summarise the key characteristics and findings of the primary studies in table form and to address the review questions.

## **Results**

### **Quality Assessment**

Data produced by the two reviewers in response to the Detsky questions were assessed using intraclass correlation; Cronbach's Alpha = 0.95, indicating good inter-rater reliability. Overall, the quality of included studies was varied. The Detsky scores (min 0 max 15) ranged from 3.5 (Bengtsson, 1983) to 15 (Furze *et al.*, 2009). Table 1 details the Detsky score obtained for each primary study. Scores under 10

were derived from Bengtsson (1983), Pozen *et al.*, (1977) and Barnason & Zimmerman (1995). It is therefore likely that these studies lack both internal and external validity. It can be inferred that good internal validity exists in the studies by Furze *et al.*, (2009) and Lewin *et al.*, (2002a) which scored highly on the Detsky questions. Nine of the thirteen studies have Detsky scores between 10 and 13.5 suggesting that the majority of the primary studies have moderate internal validity and are comparable in terms of quality. The lack of internal validity in some of the primary studies should be borne in mind when interpreting the results of the descriptive synthesis and making assumptions about external validity.

### **Study characteristics**

Details of the studies identified and their results are given in Table 1.

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**Table 1 here**

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### **Synthesis of results**

Adopting a significance level of  $p=0.05$  (across all studies and outcome measures), eight of the interventions had a significant positive effect (improved outcome) on belief change: Cupples, 1991, Furze *et al.*, 2009, Lidell & Fridlund, 1996, Lewin *et al.*, 2002a, Lewin *et al.*, 2002b, Petrie *et al.*, 2002, Pozen *et al.*, 1977 and Tullman *et al.*, 2007. One intervention (Buckley *et al.*, 2007) had either a significant positive effect or no difference depending on the cognition measured. Three interventions had no significant effect on belief change (Barnason & Zimmerman, 1995, Bengtsson, 1983 and Martinali *et al.*, 2001) and one intervention had a negative effect with the control treatment having a significant positive effect on belief change in comparison to the intervention (Bolman *et al.*, 2005). Overall, this suggests that it

is possible to devise interventions which significantly and positively change maladaptive illness cognitions.

## **Outcome measures**

A number of outcome measures were used to assess belief change in the thirteen primary studies. These are detailed in Table 2. It is difficult to ascertain whether the measures of belief change utilised may impact the results of the synthesis due to the variety of measures used and due to poor reliability of some of the measures.

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**Table 2 here**

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## **Type of intervention**

The type of intervention was divided into three components (Table 3). Firstly, whether the intervention to change beliefs is part of a multifaceted intervention (this includes either multiple methods of belief change or additional components such as exercise programmes) or whether it is a stand-alone intervention. Secondly, according to method of belief change (e.g. counselling, and/or education, cognitive behavioural therapy or self-education). Finally, according to method of delivery (e.g. verbal, verbal and written, self-administered auditory or self-administered written). The term 'self-administered' refers to those interventions that can be implemented by the patient alone at a time and location of their choice without assistance from another individual.

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**Table 3 here**

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Table 3 shows us that it is not possible to tell whether belief change is more effective as part of a multifaceted intervention or as part of a stand-alone intervention but interventions to change beliefs can be effective in either instance. The results of counselling and / or educational interventions that are delivered verbally are mixed. Four of the interventions in this category resulted in significant positive belief change (improved outcome) (Lidell & Fridlund, 1996, Cupples, 1991, Pozen, 1977 and Tullman *et al.*, 2007), one intervention had mixed results (some significant differences and some insignificant differences) depending on the cognition assessed (Buckley *et al.*, 2007), and two interventions had no significant effect on belief change (Bengtsson, 1983 and Barnason & Zimmerman, 1995). It should be noted that the methodological quality of the two insignificant studies was poor and that the results of the study by Barnason & Zimmerman merely show that the 'top up' interventions provided no additional benefits.

All three of the multifaceted cognitive behavioural interventions resulted in significant positive belief change (Furze *et al.*, 2009, Lewin *et al.*, 2002a and Petrie *et al.*, 2002). Cognitive behavioural interventions were effective whether they were delivered verbally or whether they were partially self-administered. The methodological quality of these studies was good.

The self-administered auditory (cassette tape) intervention (Lewin *et al.*, 2002b) was an effective method of belief change. Again, the quality of this study was good. The two self-administered written interventions in which participants identified gaps in their own knowledge were not effective methods of belief change (Bolman *et al.*, 2005 and Martinali *et al.*, 2001). The intervention was identical in these studies (access to a frequently asked questions checklist). The quality of these trials was relatively good. It was inappropriate to directly compare the five interventions that



involved a self-administered component as the method of belief change utilised differed.

Overall the majority of interventions designed to elicit positive and correct illness cognitions about CHD were effective. Such interventions can be effective either as part of a multifaceted intervention or as a stand-alone intervention. However, due to the numerous differences in the structure of each intervention, the method of belief change and the method of delivery, it is difficult to ascertain whether there is a relationship between type of intervention and effect on belief change. Therefore, results of the analysis should be interpreted with caution and the potential effect of differences in study quality, participants and outcome measures must be borne in mind. Due to differences in outcome measures it was not possible to establish the magnitude of the effect of the intervention. However, based on the information available, multifaceted cognitive behavioural interventions appeared to be the most consistently effective method of belief change. Other methods of belief change such as counselling and education appeared to be effective in some instances. There was no evidence to suggest that interventions in which patients identify gaps in their own knowledge and seek education are effective.

We explored whether interventions that were delivered by a health care professional (e.g. nurse or psychologist) were more effective than interventions that were self administered by the patient, however we were unable to draw any firm conclusions regarding this comparison due to the limited information available.

## **Secondary Outcomes**

A number of secondary outcomes of interest were measured in the studies, and are shown in Table 1. However, due to a lack of similar studies reporting on each of these secondary outcomes, methodological and statistical heterogeneity and methodological problems in some studies, it was difficult to compare the results of the psychological, functional and behavioural outcomes. The included studies provided no clear evidence to suggest that significant change in illness cognitions was accompanied by change in psychological, functional or behavioural outcomes.

## **Discussion**

Following a systematic search of the literature, thirteen studies which met the review inclusion criteria were included in the review. Although all included studies were RCTs, the quality of studies varied. Some studies exhibited methodological bias which may affect the internal validity of the results presented. It is therefore necessary to interpret the assimilation of results cautiously; firstly because there are relatively few studies included in the synthesis and secondly because of heterogeneity and differences in primary study quality.

Participants included male and female adults of all ages with diagnosis of CHD (including people diagnosed with MI or angina or those receiving revascularisation). There was no clear link between patient group and effectiveness of interventions to change beliefs on belief change.

It should be noted that the frequency and duration of the interventions and the length of time to follow-up also differed across interventions although this was not explored in the descriptive synthesis due to lack of precise information in some of the primary

studies. The review finds that interventions to change beliefs can be successful, with cognitive behavioural interventions being the most consistently effective. The evidence for whether interventions to change maladaptive beliefs can improve psychological, functional and behavioural outcomes is unclear. It is therefore not possible to determine which types of intervention are most effective in creating improvements in these important outcomes.

### **Methodological issues**

The major weakness of the review methodology was the lack of a search for non-English language literature, unpublished trials and grey literature due to time and resource constraints. It is therefore possible that the review has a publication bias.

With hindsight the inclusion criteria for comparisons between the different trial arms should have been worded to ensure that a direct comparison was made between a group who received an intervention to change maladaptive illness beliefs and a control group who did not receive an intervention to change beliefs. Had this criterion been in place, the study by Barnason & Zimmerman (1995) would not have been included in the review, as all three groups in this study received an intervention to change beliefs then two groups received additional 'top up' interventions.

It can be suggested that a minimal quality check of study quality at the study selection stage may have proved useful as it appears that the randomisation procedure adopted in many of the included trials was inadequate. The purpose of only including RCTs was to synthesise the results of the best quality research

available to answer the review questions, yet some of the included studies did not meet the standard of research that was anticipated.

This said, the overall methodology was good. Stringent a-priori planning of the review was conducted and where possible two or more reviewers conducted each stage of the review process in order to minimise bias.

### **Evaluation of outcome measures**

A number of different outcome measures were used to assess belief change in the primary studies. These assessed different cognitions including beliefs, knowledge and misconceptions. It was not possible to draw any conclusions regarding the difference between changes in knowledge, attitudes, beliefs and misconceptions from the results of the review due to the poor internal reliability of some of the outcome measures utilised and also due to differences in primary study quality. However, it remained important to consider whether changes in beliefs, knowledge, perceptions and misconceptions are comparable. For example, each of the three studies that measured change in misconceptions utilised interventions that were significantly effective. This supports the findings of Furze *et al.*, (2005) who state that misconceptions about CHD are easily reversed. However, the effects of the interventions which aimed to change knowledge, attitudes and beliefs were mixed, which could imply that these cognitions may be harder to change via intervention.

It is evident from the literature that there are important differences between knowledge and beliefs. For example, McCoy *et al.*, (1992) found that current 'typical' smokers acknowledged that smoking causes health problems, yet exhibited an

optimistic bias and thus believed that their personal health risk was less than that of the 'typical' smoker. This suggests that someone might know that smoking causes CHD but simultaneously believe that it will not affect them. This alludes to the idea that significant change in beliefs may be more likely to result in behaviour change than significant change in knowledge. Furthermore, it may be easier to change knowledge than beliefs or attitudes. Two studies included in the review assessed knowledge, beliefs and attitudes. In the study by Tullman *et al.*, (2007) both knowledge and beliefs were significantly positively improved as a result of the intervention. Attitudes were not. In the study by Buckley *et al.*, (2007) knowledge was significantly improved but there was no significant difference in the beliefs or attitudes of participants in the intervention group. This appears to support the suggestion that attitudes and beliefs may prove harder to change. However, the internal reliability of the outcome measures used to assess change in beliefs and attitudes in the study by Buckley *et al.*, (2007) was poor. Further research which utilises reliable and valid measures to assess these different cognitions is required, in order to determine which of significant change in knowledge, beliefs, attitudes or misconceptions is most likely to lead to adaptive coping strategies, behaviour change and thus improved outcome for people with CHD.

### **Application of the CSM**

Leventhal's Common Sense Model can be used to explain the relationship between illness beliefs, coping and medical, psychological and social outcomes. Four of the primary studies included in the review explicitly mention the theoretical framework of the CSM as informing the design of the intervention or the interpretation of results (Buckley *et al.*, 2007, Furze *et al.*, 2009, Petrie *et al.*, 2002 and Tullman *et al.*, 2007).

The methodological quality of each of these studies was relatively good and it is interesting to note that the interventions used in all four studies resulted in mixed or positive outcomes on measures of belief change. The CSM is of use in theorising about the results obtained in the studies which measured change in beliefs; however it cannot be directly applied to those studies which measured change in knowledge, or attitudes.

The interventions that combined counselling and education which were judged to be of good methodological quality and the interventions that provided cognitive behavioural therapy may have been particularly effective in creating positive belief change as they offer both factual and emotional support. This concept can be accounted for using the theoretical framework of the CSM, as Leventhal *et al.*, (1980) suggest that cognitive representations of a health threat and emotional reactions to that threat are processed independently. The encouragement of positive emotional reactions in addition to positive illness representations may therefore lead to implementation of both problem-focused and emotion-focused coping strategies. Emotional reactions to CHD may be an important factor in determining positive belief change and coping.

The wider literature suggests that interventions that tackle maladaptive emotional reactions may result in improved functional and psychological outcomes for people with CHD. For example, Gruen (1975) randomised 70 MI patients to an intervention group who received psychotherapy consisting of support, reinforcement and reassurance or to a control group who received standard care. At the four month follow-up, participants in the intervention group had spent significantly less time in

hospital and reported significantly less anxiety. Additionally, Thompson & Meddis (1990) discovered that MI patients randomised to receive in-hospital counselling plus standard care exhibited significantly less anxiety and depression during the hospitalisation period and at the six month follow-up in comparison to a control group who received standard care. Furthermore, Havik & Maeland (1990) suggest that emotional recovery following MI can directly affect an individual's motivation to make lifestyle changes. However, there is not enough evidence from the results of the present review to demonstrate that interventions which encourage adaptive emotional responses in addition to adaptive illness beliefs are more likely to result in positive behavioural, functional and psychological outcomes. This does not mean that interventions are ineffective in creating such change; the review simply reveals that there is a lack of high quality research in this area.

### **Implications for future research**

The present review demonstrates the need for methodologically sound and adequately powered trials of interventions to change maladaptive illness cognitions to determine whether they are effective in eliciting change and creating positive behaviours and outcomes in people with CHD. The follow-up time of such interventions should be long enough to determine whether any positive effects remain stable over time. In addition to assessing change in beliefs, it is important that future research attempts to investigate the coping strategies implemented by individuals and any resulting differences in behavioural, functional or psychological outcomes. The theoretical framework of Leventhal's Common Sense Model can be usefully employed when designing an intervention to change beliefs. Cognitive behavioural interventions appear promising, and could perhaps be used in

conjunction with education and counselling. It is important that researchers choose a reliable and valid measure to assess change in the cognition(s) of interest.

### **Implications for clinicians, policy makers and people with CHD**

Although at present it is not clear whether interventions to change maladaptive illness beliefs are effective in improving behavioural, functional and psychological outcomes, it is evident that maladaptive beliefs can be easily identified using valid questionnaires and changed via intervention. Therefore, as recommended by SIGN, it may be beneficial for clinicians to identify and correct maladaptive beliefs with the intention of encouraging development of adaptive coping strategies. While we cannot state definitively how this should be done, those using a cognitive behavioural approach to elicit and actively dispel misconceptions are likely to be the most effective. Nurses engaged in cardiac rehabilitation and / or in supporting the management of heart disease among their patients may require further training in the application of cognitive behavioural techniques. This form of training is included in programmes to teach facilitation of the Heart Manual (Lewin et al. 1992) and the Angina Plan (Lewin et al. 2002). It also can be suggested that primary prevention strategies which are designed to dispel common misconceptions about CHD and educate about the causes and consequences of CHD in the population at large may also be useful in addition to the use of secondary prevention / rehabilitation initiatives.

### **Conclusions**

It is possible to devise interventions to significantly and positively change maladaptive illness cognitions in people with CHD. Cognitive behavioural



interventions may be particularly effective and counselling and / or educational interventions can be effective in some circumstances. Nurses need to take account of what patients believe about their condition and aim to dispel misconceptions in order to promote positive behaviour change.

Perhaps the most important finding of the present review is that there is a dearth of good quality randomised controlled trials investigating the efficacy of maladaptive belief change interventions for people with CHD.

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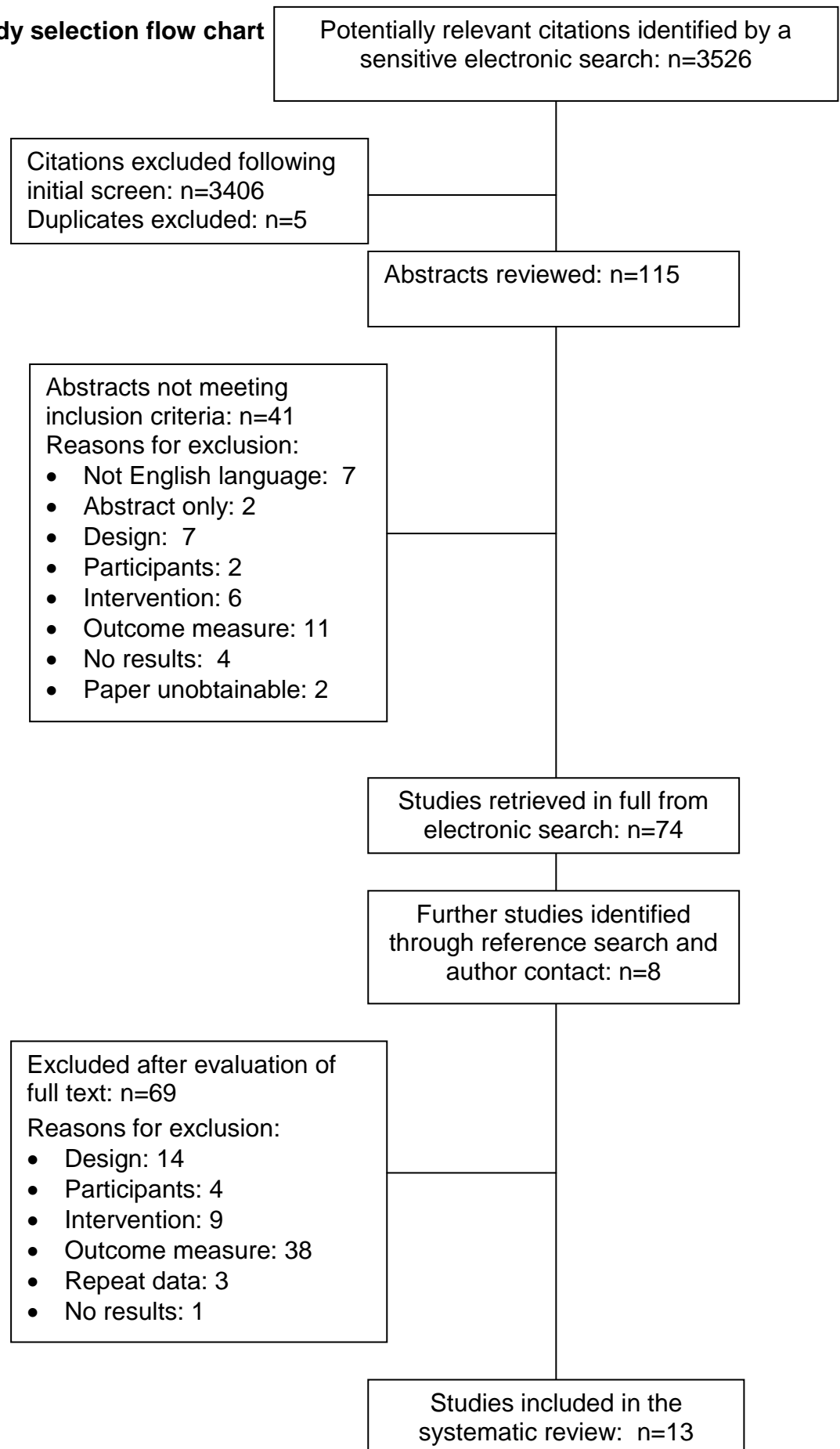
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**FIGURE 1: Study selection flow chart**





**TABLE 1: Main characteristics of the 13 included primary studies including their results**

<b>First author, Year and country</b>	<b>Participants and setting</b>	<b>Design, Detsky score, sample sizes per group (intervention/control) and follow-up</b>	<b>Intervention</b>	<b>Control</b>	<b>Outcomes</b> (Primary outcome presented in <b>bold</b> )	<b>Result</b> (significance set at $p=0.05$ )
Barnason <i>et al.</i> 1995 USA	90 post-operative CABG patients.  Inpatients OR inpatients then outpatients depending on group assignment.	RCT  Detsky score: 9  Sample sizes per group: 30/30/30  Follow-up: on completion of intervention (5 days to 2 weeks)	1) Inpatient teaching (as control) plus outpatient group teaching at 2 weeks post-discharge.  2) Inpatient teaching and post-discharge telephone (call timing not stated)	Inpatient teaching alone - day 5 or 6 post operation.	<b>Knowledge</b> , patient satisfaction	No significant difference between groups on any outcome
Bengtsson 1983	171 MI patients.  Outpatients.	RCT  Detsky score: 3.5	Cardiac rehabilitation with counselling and	Standard care.	<b>Knowledge</b> , return to work, weight, smoking, anxiety,	No significant difference between groups on any outcome

Sweden		Sample sizes per group: 81/90 Follow-up: 8-19 months post MI (mean 14 mths)	education		depression	
Bolman <i>et al.</i> 2005 Netherlands	118 patients with angina, post PTCA, post CABG or CAD. Outpatients.	RCT Detsky score: 12 Sample sizes per group: 53/65 Follow-up: 4 and 10 months post-discharge	Frequently Asked Questions (FAQ) checklist to use when visiting the cardiologist. (Same checklist as used in Martinali <i>et al.</i> , 2001).	Standard care plus a brochure from the Dutch Heart Foundation.	<b>Knowledge</b> , Anxiety before first visit	Significant difference in favour of control for knowledge. Significant difference in favour of the intervention for anxiety.
Buckley <i>et al.</i> , 2007 Australia	200 CAD patients. Outpatients.	RCT Detsky score: 12 Sample sizes per group: 105/95 Follow-up: 3 and 12 months	Individualised face-to-face education and counselling plus reinforcing telephone calls	Standard care	<b>Knowledge, attitudes, beliefs</b>	Significant difference in favour of the intervention for knowledge. No difference in attitudes or beliefs
Cupples 1991	40 Patients awaiting CABG	RCT Detsky score: 10	Preadmission preoperative	Standard care.	<b>Knowledge</b> , anxiety, positive mood state,	Significant differences in favour of the intervention for knowledge,

USA	surgery. Pre-admission then inpatients.	Sample sizes per group: 20/20 Follow-up: 6 days	education and reinforcing telephone call 4 days preadmission plus usual care.		physiologic recovery	positive mood state and physiologic recovery. No difference in anxiety.
Furze <i>et al</i> , 2009 UK	204 Patients awaiting CABG surgery. Outpatients.	RCT Detsky score: 15 Sample sizes per group: 100/104 Follow-up: 8 weeks post intervention (pre- op); 6 weeks, 3 and 6 months post-op	A manualised, cognitive behavioural, face-to-face intervention with telephone follow up.	Nurse counselling and education with telephone follow-up of comparable length to the intervention.	<b>Misconceptions</b> , depression, physical functioning, anxiety, length of hospital stay,	Significant differences in favour of the intervention for misconceptions pre and post op, and in pre-op depression and physical functioning. No difference in anxiety, or post op depression, physical functioning or length of hospital stay
Lewin <i>et al</i> , (2002a) Angina Plan UK	142 angina patients, diagnosis in the last 12 months. Outpatients.	RCT Detsky score: 13.5 Sample sizes per group: 68/74 Follow-up: 6 months	Angina Plan: a brief cognitive behavioural, manualised face-to- face intervention with telephone follow-up.	Face-to-face nurse led educational and risk factor counselling and telephone follow-up of comparable	<b>Misconceptions</b> , anxiety, depression, physical limitations	Significant differences in favour of intervention for misconceptions, anxiety, depression and physical limitations

				length to intervention.		
Lewin <i>et al.</i> , (2002b) Tape study UK	243 patients within 24 hours of acute MI. Inpatients.	RCT Detsky score: 13 Sample sizes per group: 114/129 Follow-up: 3 days and 6 months	Advice and relaxation cassette tape to address misconceptions / worries and give advice.	Music tape	<b>Misconceptions</b> , anxiety, depression, health-related quality of life	Significant difference in favour of intervention for misconceptions. No differences in anxiety, depression or health-related quality of life
Lidell <i>et al.</i> 1996 Sweden	116 MI patients. Outpatients.	RCT Detsky score: 10.5 Sample sizes per group: 53/63 Follow-up: 5 years	A 6 month comprehensive cardiac rehabilitation programme that included post MI support and education. A home training programme and telephone contact was also provided.	Routine medical care.	<b>Knowledge about CHD,</b> <b>misconceptions,</b> <b>knowledge about lifestyle</b> <b>factors</b> , physical condition, lifestyle modification	Significant differences in favour of the intervention for knowledge about CHD, misconceptions, physical condition and lifestyle modification. No significant differences in knowledge about lifestyle.

Martinali <i>et al.</i> 2001 Netherlands	103 CAD patients.  Outpatients.	RCT  Detsky score: 10  Sample sizes per group: 53/50  Follow-up: Immediately post consultation	Frequently Asked Questions checklist to use when visiting the cardiologist.  (Same checklist as used in Bolman <i>et al.</i> , 2005).	Standard care plus a brochure from the Dutch Heart Foundation.	<b>Knowledge</b> , anxiety, satisfaction, length of consultation	Significant difference in favour of intervention for anxiety. No difference in knowledge, satisfaction or length of consultation
Petrie <i>et al.</i> , (2002) New Zealand	65 MI patients.  Inpatients.	RCT  Detsky score: 10  Sample sizes per group: 31/34  Follow-up: Discharge and 3 months	Three cognitive behavioural therapy sessions with a psychologist. A written action plan for patients was produced.	Standard care.	<b>Illness Perception Questionnaire subscales (Consequences, Timeline, Cure/control and Identity)</b> , distress, preparation for leaving hospital, return to work, angina symptoms and attendance at rehabilitation	Significant differences in favour of the intervention for perceptions of: consequences, timeline, cure/control and distress at discharge, and for perceptions of timeline and cure/control, preparation for leaving hospital, return to work and angina symptoms at 3 months. No difference in perceptions of identity at discharge or in perceptions of

						consequences and identity, or distress and attendance at rehabilitation at 3 months
Pozen <i>et al.</i> 1977 USA	102 MI patients, divided into high / low risk. Inpatients.	RCT - randomised within risk categories Detsky score: 7 Sample sizes per group: 55 (36 high risk and 19 low risk) /47 (34 high risk and 13 low risk) Follow-up: discharge and 6 months	Nurse provided counselling and education	Standard care.	<b>Knowledge of drugs, knowledge of symptoms of MI</b> , return to work, decrease in smoking	Significant differences in favour of the intervention for knowledge of drugs (low & high risk patients), knowledge of symptoms of MI (high risk patients only), return to work, decrease in smoking. No difference for knowledge of symptoms of MI among low risk patients
Tullman <i>et al.</i> , 2007 USA	115 CAD patients. Intervention usually delivered at the patient's home.	RCT Detsky score: 12 Sample sizes per group: 58/57 Follow-up: 3 months	One-on-one education and counselling which addressed the cognitive and emotional elements	Standard care	<b>Knowledge, beliefs, perceived control, attitudes</b> , anxiety	Significant differences in favour of intervention for knowledge, beliefs and perceived control. No difference in attitudes or anxiety.

			of Leventhal's framework.			
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**TABLE 2: Measure used to assess change in cognition and details of reliability and validity where available**

<b>Study ID</b>	<b>Outcome measure</b>	<b>Internal reliability / validity</b>
Barnason & Zimmerman (1995)	Heart disease management questionnaire	Poor reliability: Kuder Richardson =0.36
Bengtsson (1983)	Multiple choice knowledge questionnaire	Unclear
Bolman <i>et al.</i> , (2005)	CAD knowledge questionnaire	Unclear
Buckley <i>et al.</i> , (2007)	Response questionnaire	Poor internal reliability: attitudes: Cronbach's alpha 0.65-0.71, beliefs: Cronbach's alpha 0.55-0.6
Cupples (1991)	CABG surgery knowledge questionnaire	Good internal reliability: Cronbach's alpha in previous study 0.71, test-retest 0.87, content validity assessed by face validity.
Furze <i>et al.</i> , (2009)	York Cardiac Beliefs Questionnaire	Good internal reliability: Cronbach's alpha 0.85, test retest r=0.88. Content validity not reported.
Lewin <i>et al.</i> , (2002b) Tape study	The Cardiac Misconceptions Scale	Authors report satisfactory internal reliability and validity.
Lewin <i>et al.</i> , (2002a) Angina Plan	Angina Misconceptions Scale	Good internal reliability: Cronbach's alpha 0.76. Test-retest r=0.72. Content validity not reported.
Lidell & Fridlund (1996)	The Cardiac Misconceptions Scale	Knowledge: good internal reliability (Cronbach's alpha=0.78), cardiac misconceptions: poor internal reliability (Cronbach's alpha=0.50), lifestyle knowledge: poor internal reliability (Cronbach's alpha=0.48)
Martinali <i>et al.</i> , (2001)	CAD knowledge questionnaire	Unclear
Petrie <i>et al.</i> , (2002)	The Illness Perceptions Questionnaire	Good internal reliability: Cronbach's alpha 0.73-0.82
Pozen <i>et al.</i> , (1977)	Knowledge questionnaire	Unclear
Tullman <i>et al.</i> , (2007)	Questionnaires of knowledge, attitudes and beliefs	Knowledge: good internal reliability, Cronbach's alpha 0.78



**TABLE 3: Type of intervention: Effect of structure of intervention, method of belief change and method of delivery on statistical outcome**

Structure: Multifaceted or Stand- alone	Method of belief change	Method of delivery	Study ID	Statistical difference: intervention Vs control on measure of belief change at follow-up
Multifaceted	Counselling & education	Verbal	Bengtsson (1983)	No sig. difference
			Lidell & Fridlund (1996)	Sig. +ve difference in favour of intervention
Stand-alone	Counselling & education	Verbal	Buckley <i>et al.</i> (2007)	Mixed: sig.+ve difference in favour of intervention for knowledge, no sig. difference for attitudes / beliefs
			Pozen <i>et al.</i> , (1977)	Sig. +ve difference in favour of intervention
			Tullman <i>et al.</i> , (2007)	Sig. +ve difference in favour of intervention
Dependent on group	Education	Verbal	Barnason & Zimmerman (1995)	No sig. difference
Stand-alone			Cupples (1991)	Sig. +ve difference in favour of intervention
Multifaceted	Cognitive behavioural	Verbal	Petrie <i>et al.</i> , (2002)	Sig. +ve difference in favour of intervention
Multifaceted	Cognitive behavioural	Verbal and self- administered written	Furze <i>et al.</i> , (2009)	Sig. +ve difference in favour of intervention
			Lewin <i>et al.</i> , (2002a) Angina Plan	Sig. +ve difference in favour of intervention
Stand-alone	Education	Self- administered, auditory	Lewin <i>et al.</i> , (2002b) Tape study	Sig. +ve difference in favour of intervention
Stand-alone	Identify own gaps in knowledge and seek education	Self- administered, written	Bolman <i>et al.</i> , (2005)	Sig. +ve difference in favour of control
			Martinali <i>et al.</i> , (2001)	No sig. difference

**Key:** Sig.=significant, +ve = positive (i.e. improved outcome)  
(significance set at  $p=0.05$ )

## APPENDIX 1: Search strategy

Search strategy used to search Medline, EMBASE, CINAHL, BNI, and PsychINFO

Line	Search
1	heart disease.mp. or exp Heart Diseases/
2	coronary heart disease.mp. or exp Coronary Disease/
3	myocardial infarction.mp. or exp Myocardial Infarction/
4	exp Microvascular Angina/ or exp Angina Pectoris, Variant/ or exp Angina Pectoris/ or exp Angina, Unstable/ or angina.mp.
5	(revascularization or revascularisation).mp. [mp=title, original title, abstract, name of substance word, subject heading word]
6	exp Angioplasty, Transluminal, Percutaneous Coronary/ or exp Angioplasty, Balloon/ or exp Angioplasty, Laser/ or exp Angioplasty/ or exp Angioplasty, Balloon, Laser-Assisted/ or angioplasty.mp.
7	percutaneous coronary intervention.mp.
8	exp Coronary Artery Bypass/ or coronary artery bypass graft.mp. or exp Myocardial Revascularization/
9	1 or 2 or 3 or 4 or 5 or 6 or 7 or 8
10	exp Health Knowledge, Attitudes, Practice/ or misconception\$.mp.
11	belief\$.mp.
12	(negative thought\$ or negative thinking).mp. [mp=title, original title, abstract, name of substance word, subject heading word]
13	illness perception\$.mp.
14	illness cognition\$.mp.
15	exp Attitude to Health/ or exp Perception/ or exp Sick Role/
16	(maladaptive thoughts or maladaptive thinking).mp. [mp=title, original title, abstract, name of substance word, subject heading word]
17	10 or 11 or 12 or 13 or 14 or 15 or 16
18	9 and 17
19	cognitive.mp. or exp Cognitive Therapy/
20	Cogni\$.sh.
21	cognitive behavioural therapy.mp. or exp Treatment Outcome/
22	exp Behavior Therapy/ or behavioural therapy.mp.
23	behavio\$.mp.
24	exp Health Behavior/
25	psychotherapy.mp. or exp Psychotherapy, Multiple/ or exp Psychotherapy/ or exp Psychotherapy, Group/ or exp Psychotherapy, Brief/ or exp Psychotherapy, Rational-Emotive/
26	exp Adaptation, Psychological/ or psychosocial intervention\$.mp.

27	rehabilitation.mp. or exp Rehabilitation/
28	cardiac rehabilitation.mp.
29	exp Self-Help Devices/ or exp Self-Help Groups/ or self help.mp.
30	disease management.mp. or exp Disease Management/
31	health education.mp. or exp Health Education/
32	19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31
33	RANDOMIZED CONTROLLED TRIAL.pt.
34	CONTROLLED CLINICAL TRIAL.pt.
35	RANDOMIZED CONTROLLED TRIALS.sh.
36	RANDOM ALLOCATION.sh.
37	DOUBLE BLIND METHOD.sh.
38	SINGLE BLIND METHOD.sh.
39	33 or 34 or 35 or 36 or 37 or 38
40	(ANIMALS not HUMANS).sh.
41	39 not 40
42	CLINICAL TRIAL.pt.
43	CLINICAL TRIALS.mp. or exp Clinical Trial/
44	(clin\$ adj25 trial\$).ti,ab.
45	((singl\$ or doubl\$ or trebl\$ or tripl\$) adj25 (blind\$ or mask\$)).ti,ab.
46	PLACEBOS.sh.
47	placebo\$.ti,ab.
48	random\$.ti,ab.
49	RESEARCH DESIGN.sh.
50	42 or 43 or 44 or 45 or 46 or 47 or 48 or 49
51	50 not 40
52	51 not 41
53	41 or 52
54	exp "Review Literature as Topic"/ or systematic review.mp.
55	review.mp.
56	meta analysis.mp. or exp Meta-Analysis/
57	54 or 55 or 56
58	53 not 57
59	18 and 32 and 58